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## Storage duration of button mushroom in different packaging condition

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### Abstract

The increased demand of button mushroom needs to increase its shelf life as they become unacceptable by consumer after 2-3 days of harvesting due to loss of freshness, off colour & veil opening. Keeping the view to extend the self life of mushroom a trial was conducted in Saraiya block of Muzaffarpur district to evaluate the freshness, colour change & veil opening of button mushroom in different packaging practices. Farmers use the practice of dipping mushroom in the unknown solution of potassium metabisulfite for colour improvement & after surface drying they packed in locally available polythene bag with one or two holes. As potassium metabisulfite should be used in prescribed amount. So 0.05 percent solution was used in another treatment and after removing excess surface water it was packed in 100 gauge polypropylene bag with 5% vent area. Button mushroom in unwashed condition was also taken under study in 2<sup>nd</sup> treatment It was found that after first day of storage all the practices showed good result with full freshness, pure white colour with no veil opening. On 2<sup>nd</sup> day of storage the farmer's practice of storage showed better result with pure white colour, whereas sample under treatment 1 & 2 was comparatively less white. But after 3<sup>rd</sup> day the result of unwashed mushroom was better with minimum veil opening of 59% until 6<sup>th</sup> day when all the sample which were washed in potassium metabisulfite solution damaged totally, whereas unwashed mushroom was slightly fresh. So for longer duration of storage it is better to store mushroom in unwashed condition as it is free from chemicals & beneficial from health point of views.

**Keywords:** Button mushroom, potassium metabisulfite, chemicals

### Introduction

Mushrooms are one of the greatest untapped nutritious food options in the world (Afiukwa 2013) <sup>[1]</sup>, since they are abundant in proteins, minerals, vitamins; fibers and contain an abundance of essential amino acids (Sadler, 2003) <sup>[11]</sup> and diabetic delight (Rai and Arumuganathan, 2008) <sup>[10]</sup>. They are also known to have promising effects on antioxidants, cardiovascular, hypercholesterolemia, antimicrobials, hepatoprotection and anticancer (Khatun, 2012) <sup>[5]</sup>.

Because of its thin, porous epidermal composition, mushroom is highly perishable in nature. The texture of mushroom is very fragile is very fragile resulting in a high respiration rate and gradually starts to deteriorate soon after harvesting. Another most important causative factor for quality and colour deterioration is presence of tyrosinase and phenolic content, which make them prone to enzymatic browning and ultimately reduction in its market value (Beelman and Simons 2000) <sup>[3]</sup>.

So there's a need to extend mushroom shelf life for which special handling is needed. Packaging plays a very important role during product storage and transportation and is an important aspect of post-harvest handling from the manufacturing site to the consumer. Polythene is the cheapest and most commonly used in developing countries for food packaging. This is available in a wide variety of thicknesses and grades, all of which are fairly strong flexible, heat sealable and transportable, so farmer's use polythene bag in 200 gm for mushroom sales.

It has been found that mushroom washing in 0.05 per cent potassium metabisulphite improved the initial whiteness, which lasted longer during storage, although many farmers adopt this washing approach, but selling clean unwashed properly packed mushrooms may be a better option, as many people prefer mushroom just because of their health but also consider it a more chemical-free food (Mushr). This trial was conducted to investigate the effect of packaging material on post-harvest self-life and mushroom quality.

**Method and material:** The trial was conducted at farmer's field in six replication who has been engaged in cultivation and marketing of button mushroom. Post-harvest storage

duration can be checked by using polythene bag of different thickness or vent area. The trial was conduct in three treatments as shown in Table 1

**Table 1:** The trial was conduct in three treatments as shown in table

S. No.	Treatment	Detail	Remarks
1.	T <sub>0</sub>	Farmers practice by storing button mushroom after washing in solution of potassium metabisulphite followed by surface drying and packed in 200gm capacity polythene bag of unknown thickness as available in market	Packing of washed mushroom in 100 gauge thick polypropylene bags also helps in retaining the quality for a much longer period than packaging in ordinary polythene bags. Mushroom stored in 200gm and 400gm capacity had a better shelf life at both ambient and low temperature compared to higher capacity (Annual report, 2017-18, ICAR-Directorate of Mushroom Research).
2.	T <sub>1</sub>	Storage of button mushroom in unwashed condition after removing the soil and store in polypropylene bag of 100 gauge thicknesses with 5% vent area having capacity to store 200 gm fresh button mushroom	
3.	T <sub>2</sub>	Storage of button mushroom after washing in 0.05% solution of potassium metabisulphite and after surface drying packed in 200gm capacity polythene bag with 5% vent area.	

## Result & Discussion

Storage result of button mushroom during January month (25<sup>th</sup> to 30<sup>th</sup>).

Type of practices	Freshness appearance			Colour appearance				Veil opening percentage	Remarks
	Fully fresh	Slight fresh	damaged	Pure white	Off white	Slightly brown	Fully brown		
<b>Result after 1<sup>st</sup> day of storage</b>									
T <sub>0</sub>	✓			✓					All three practices were same
T <sub>1</sub>	✓			✓					
T <sub>2</sub>	✓			✓					
<b>Result after 2<sup>nd</sup> day of storage</b>									
T <sub>0</sub>	✓			✓				7	Farmers practice was slightly superior in compare to others
T <sub>1</sub>	✓				✓			5	
T <sub>2</sub>	✓				✓			22	
<b>Result after 3<sup>rd</sup> day of storage</b>									
T <sub>0</sub>	✓				✓			33	Farmers practice was slightly superior in compare to others
T <sub>1</sub>		✓				✓		25	
T <sub>2</sub>		✓				✓		50	
<b>Result after 4<sup>th</sup> day of storage</b>									
T <sub>0</sub>		✓				✓		66	Unwashed mushroom is superior in quality
T <sub>1</sub>		✓				✓		59	
T <sub>2</sub>		✓					✓	86	
<b>Result after 5<sup>th</sup> day of storage</b>									
T <sub>0</sub>			✓				✓	86	Unwashed mushroom is superior in quality
T <sub>1</sub>		✓				✓		100	
T <sub>2</sub>			✓				✓	100	
<b>Result after 6<sup>th</sup> day of storage</b>									
T <sub>0</sub>			✓				✓		Unwashed mushroom is superior in quality
T <sub>1</sub>		✓					✓		
T <sub>2</sub>			✓				✓		

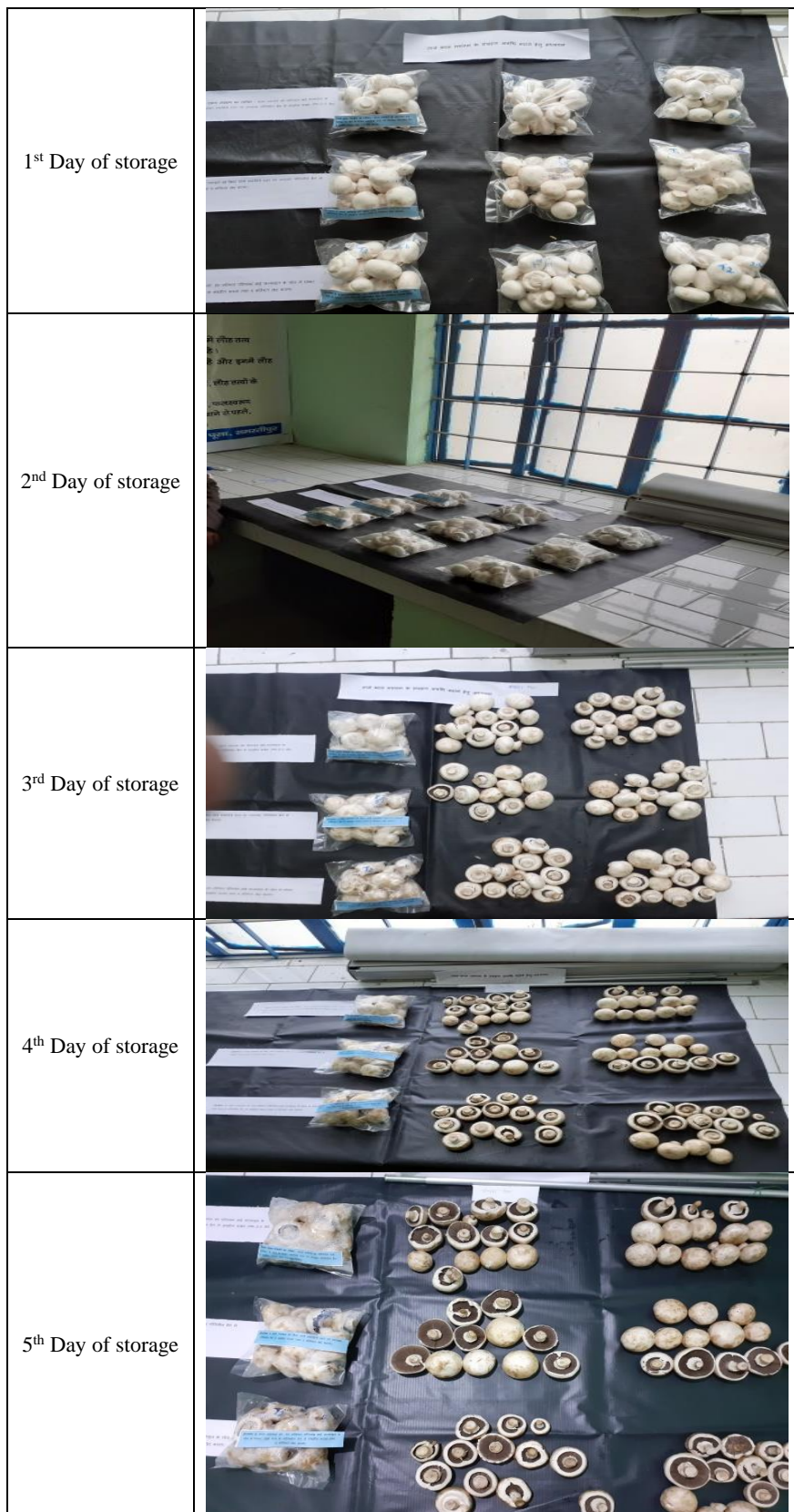
The result showed that if button mushroom has stored in 200 gm polythene bags during winter season within a temperature ranges of 7.80c-18.90c and humidity ranges of 37%-78% in of 100 gauge polypropylene after washing in unknown solution of potassium metabisulphite, in washed and unwashed condition in different day after storage. The fully fresh appearance of mushroom was observed (Table 1) after 1st and 2nd day of storage followed by slightly fresh in 3rd or 4th day after storage. Damaged appearance was observed in 5th and 6th day after storage excluding in treatment T1. Pure white colour appearance was observed in 1st and 2nd day after storage among all the treatment excluding treatment T1 and T2 followed by off white, slightly brown and fully brown after 3rd, 4th, 5th and 6th day after storage respectively. Loss of water content in fresh mushroom has a direct relationship with phenol oxidase activity which may correlate with the

visual degree of browning. Freshness of mushroom changed to unacceptable stage as the number of days for storing increasing (Das *et al.* 2010)<sup>[4]</sup>. Mushroom store after 3 days of storage in ambient condition, the deterioration of colour and texture was observed in mushrooms, and then began to deteriorate, accompanied by fungal growth. The magnitude of the change in colour depends on the time and temperature for storage. The above finding is in accordance of Singh *et al.* 2013 and Prerna *et al.* 2016<sup>[9]</sup>. The progression of the storage period in both ambient and refrigerated conditions could be attributed to protein and polysaccharide degradation, hyphae shrinkage, central vacuole disruption and expansion of the intercellular space on the pileal surface followed by gradual decrease in the firmness of packed mushrooms (Zivanovic *et al.* 2000 and Annual report 2016-17)<sup>[2]</sup>.

The veil opening % was very low in 1st or 2nd day after storage in comparison to 3rd to 6th day after storage. Loss of water content in fresh mushroom has a direct relationship of phenol oxidase activity which correlates with the visual degree of browning. The maximum browning and veil

opening was observed in mushrooms packed with PPSW and minimum with PP and those packed with LDPE, after 3 days in both ambient and refrigerated storage conditions (Beelman and Simon 2000) [3].

Change in freshness, colour & veil opening during 1<sup>st</sup> to 6<sup>th</sup> Days of storage.





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